

## **SECTION 07840**

### **FIRESTOPPING**

#### **PART 1 - GENERAL**

##### **0.1 DESCRIPTION OF WORK**

- A.** Work Included: This Section specifies the following.
1. Through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.
  2. Fire-resistive joint systems for floor, wall, and head-of-wall joints.
- B.** Related Work: The following items are not included in this Section and will be performed under the designated Sections:
1. Section 07842 - FIRE-RESISTIVE JOINT SYSTEMS: Fire-resistive joint sealers.
  2. Section 07920 - JOINT SEALANTS: Standard joint sealers.
  3. Section 15400 - PLUMBING SYSTEMS: Piping penetrations.
  4. Section 15500 - FIRE PROTECTION: Fire-suppression piping penetrations.
  5. Section 15600 - HEATING, VENTILATING, AND AIR CONDITIONING: Duct and piping penetrations.
  6. Division 16 - ELECTRICAL: Cable and conduit penetrations.

##### **0.2 PERFORMANCE REQUIREMENTS**

- A.** General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
- B.** F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated, as determined per ASTM E 814.
- C.** For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

### **0.3 SUBMITTALS**

- A.** Product Data: For each type of product indicated.
- B.** Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
- C.** Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:
  1. Types of penetrating items.
  2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
  3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.
- D.** Qualification Data: For Installer and Inspection and Testing Agency.

### **0.4 QUALITY ASSURANCE**

- A.** Installer Qualifications: Either a firm that has been approved by FM Global according to FMG 4991, "Approval of Firestop Contractors" or a firm experienced in installing through-penetration firestop systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction of a minimum of five projects with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements.
- B.** Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.

- C.** Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

1. Firestop tests are performed by a qualified testing and inspecting agency.
2. Through-penetration firestop systems are identical to those tested per testing standard referenced in Part 1 "Performance Requirements" Article. Provide rated systems complying with the following requirements:
  - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
  - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed in the UL "Fire Resistance Directory".

## **0.5 DELIVERY, STORAGE, AND HANDLING**

- A.** Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.
- B.** Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

## **0.6 PROJECT CONDITIONS**

- A.** Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B.** Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

## **0.7 COORDINATION**

- A.** Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

- B.** Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C.** Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been inspected by the building inspector, if required by authorities having jurisdiction.

## **PART 2 - PRODUCTS**

### **0.1 MANUFACTURERS**

- A.** Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Hilti, Inc.
  - 2. BioFireshield; RectorSeal Corporation.
  - 3. 3M; Fire Protection Products Division.
  - 4. Or approved equal.

### **0.2 FIRESTOPPING MATERIALS**

- A.** Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B.** Materials: Provide through-penetration firestop systems containing primary materials and fill materials which are part of the tested assemblies indicated in the Through-Penetration Firestop System Schedule at the end of Part 3. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill", "void" or "cavity" materials.
- C.** Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with requirements in this Section. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated

### **0.3 MIXING**

- A.** For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing

equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

## **PART 3 - EXECUTION**

### **0.1 EXAMINATION**

- A.** Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work. Proceed with installation only after unsatisfactory conditions have been corrected.

### **0.2 PREPARATION**

- A.** Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:
  - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
  - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B.** Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C.** Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

### **0.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION**

- A.** General: Install through-penetration firestop systems to comply with requirements in this Section and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

- B.** Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
- C.** Install fill materials for firestop systems by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

#### **0.4 FIELD QUALITY CONTROL**

- A.** Inspecting Agency: Engage a qualified, independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.
- B.** Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
- C.** Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

#### **0.5 CLEANING AND PROTECTING**

- A.** Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B.** Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

#### **0.6 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE**

CONCRETE FLOORS		UL-CLASSIFIED SYSTEMS			CONCRETE OR BLOCK WALLS		UL-CLASSIFIED SYSTEMS		
TYPE OF PENETRANT	F-RATING HR	HILTI	3M	BIO-FIRE	TYPE OF PENETRANT	F-RATING	HILTI	3M	BIO-FIRE
CIRCULAR BLANK OPENINGS	1	FA 0006, CAJ 0070	CAJ 0009	CAJ 0056	CIRCULAR BLANK OPENINGS	1	CAJ 0055, CAJ 0070	CAJ 0009	CAJ 0056
	2	FA 0006, CAJ 0070	CAJ 0009	CAJ 0056		2	CAJ 0055, CAJ 0070	CAJ 0009	CAJ 0056
	3	CAJ 0055	CAJ 0009	CAJ 0056		3	CAJ 0055	CAJ 0009	CAJ 0056
SINGLE METAL PIPES OR CONDUIT	1	CAJ 1226, CAJ 1278, FA 1017	CAJ 1058	CAJ 1264	SINGLE METAL PIPES OR CONDUIT	1	CAJ 1226, CAJ 1278,	CAJ 1058	CAJ 1264
	2	CAJ 1226, CAJ 1278, FA 1017	CAJ 1058	CAJ 1264		2	CAJ 1226, CAJ 1278,	CAJ 1058	CAJ 1264
	3	CAJ 1226, CAJ 1278, FA 1017	CAJ 1058	CAJ 1264		3	CAJ 1226, CAJ 1278,	CAJ 1058	CAJ 1264
	4	CAJ 8095, CBJ 1034	CAJ 1044	N/A		4	CAJ 8095, CBJ 1034, WJ 1042	CAJ 1044	WJ 1064
SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, ENT)	1	CAJ 2109, CAJ 2168, FA 2054, FA 2067	CAJ 2189, CAJ 2117, CAJ 2027	CAJ 2131	SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, ENT)	1	CAJ 2109, WJ 2108, WJ 2121	CAJ 2189, CAJ 2117, CAJ 2027	CAJ 2131
	2	CAJ 2109, CAJ 2168, FA 2054, FA 2067	CAJ 2189, CAJ 2117	CAJ 2131		2	CAJ 2109, WJ 2108, WJ 2121	CAJ 2189, CAJ 2117, CAJ 2027	CAJ2131
	3	CAJ 2109, CAJ 2168, FA 2054,	CAJ 2005, CAJ 2117	CAJ 2152		3	CAJ 2109, CAJ 2168, WJ 2091	CAJ 2005, CAJ 2117, CAJ 2027	CAJ2152
	4	N/A*	N/A*	N/A		4	WJ 2091	N/A*	N/A

SINGLE OR BUNDLED CABLES	1	FA 3007, CAJ 3095,	CAJ 3021	CAJ 3103	SINGLE OR BUNDLED CABLES	1	CAJ 3095, WJ 3060 WJ 3074	CAJ 3021	WJ 3071
	2	FA 3007, CAJ 3095,	CAJ 3021	CAJ 3103		2	CAJ 3095, WJ 3060 WJ 3074	CAJ 3021	WJ 3071
	3	FA 3007, CAJ 3095,	CAJ 3030	CAJ 3103		3	CAJ 3095, WJ 3050	CAJ 3030	CAJ 3103
	4	N/A*	N/A*	N/A		4	WJ 3050	N/A*	N/A
CABLE TRAY	1	CAJ 4034, CAJ 4054, CAJ 4017	CAJ 4003	CAJ 4048	CABLE TRAY	1	CAJ 4034, CAJ 4054, WJ 4016,	CAJ 4003	CAJ 4048
	2	CAJ 4034, CAJ 4054, CAJ 4017	CAJ 4003	CAJ 4048		2	CAJ 4034, CAJ 4054, WJ 4016,	CAJ 4003	CAJ 4048
	3	CAJ 4034, CAJ 4017	CAJ 4003	CAJ 4048		3	CAJ 4034, WJ 8007	CAJ 4003	CAJ 4048
	4	N/A*	N/A*	N/A		4	WJ 8007	N/A*	N/A
SINGLE INSULATED PIPES	1	FA 5016, FA 5017 CAJ 5090, CAJ 5091,	CAJ 5080, CAJ 5024, CAJ 5017	CAJ 5082	SINGLE INSULATED PIPES	1	CAJ 5090, CAJ 5091, WJ 5042	CAJ 5080, CAJ 5024, CAJ 5017	CAJ 5082
	2	FA 5016, FA 5017 CAJ 5090, CAJ 5091,	CAJ 5080, CAJ 5024, CAJ 5017	CAJ 5082		2	CAJ 5090, CAJ 5091, WJ 5042	CAJ 5080, CAJ 5024, CAJ 5017	CAJ 5082
	3	FA5016, CAJ 5061, CAJ 5090,	CAJ 5024, CAJ 5017	CAJ 5006		3	CAJ 5090, CAJ 5091,	CAJ 5024, CAJ 5017	CAJ 5006
	4	CBJ 5006	N/A*	N/A		4	WJ 5028, CBJ 5006	N/A*	N/A
ELECTRICAL BUSWAY	1	CAJ 6006, CAJ 6017	CAJ 6001, CAJ 6002	CAJ 6026	ELECTRICAL BUSWAY	1	CAJ 6006, CAJ 6017	CAJ 6001, CAJ 6002	CAJ 6026
	2	CAJ 6006, CAJ 6017	CAJ 6001, CAJ 6002	CAJ 6026		2	CAJ 6006, CAJ 6017	CAJ 6001, CAJ 6002	CAJ 6026
	3	CAJ	CAJ	N/A		3	CAJ	CAJ	N/A

CONTRACT NO.  
YEAR

FIRESTOPPING  
07840 - 8

MBTA  
Rev 09/07



		6006, CAJ 6017	6001, CAJ 6002				6006, CAJ 6017	6001, CAJ 6002	
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NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	CAJ 7046 CAJ 7051	CAJ 7003, CAJ 7021	CAJ 7036	NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	CAJ 7046, WJ 7029, WJ 7022	CAJ 7003, CAJ 7021	CAJ 7036
	2	CAJ 7046 CAJ 7051	CAJ 7003, CAJ 7021	N/A		2	CAJ 7046, WJ 7029, WJ 7022	CAJ 7003, CAJ 7021	CAJ 7036
	3	CAJ 7046 CAJ 7051	CAJ 7003, CAJ 7021	N/A		3	CAJ 7046 CAJ 7051	CAJ 7003, CAJ 7021	N/A
MIXED PENETRANTS	1	CAJ 8056, CAJ 8095, CAJ 8099	CAJ 8001, CAJ 8013	CAJ 8051	MIXED PENETRANTS	1	CAJ 8096, CAJ 8099 WJ 8007	CAJ 8001, CAJ 8013	CAJ 8051
	2	CAJ 8056, CAJ 8095, CAJ 8099	CAJ 8001, CAJ 8013	CAJ 8051		2	CAJ 8096, CAJ 8099 WJ 8007	CAJ 8001, CAJ 8013	CAJ 8051
	3	CAJ 8056, CAJ 8095, CAJ 8099	CAJ 8001, CAJ 8013	CAJ 8051		3	CAJ 8099 WJ 8007	CAJ 8001, CAJ 8013	CAJ 8051
	4	CAJ 8095	N/A*	N/A		4	WJ 8007	N/A*	N/A

WOOD FLOORS		UL-CLASSIFIED SYSTEMS			GYPSUM WALLBOARD ASSEMBLIES		UL-CLASSIFIED SYSTEMS		
TYPE OF PENETRANT	F-RATING	HILTI	3M	BIO-FIRE	TYPE OF PENETRANT	F-RATING	HILTI	3M	BIO-FIRE
METAL PIPES OR CONDUIT	1	FC 1009, FC 1059	FC 1002	FC 1031	METAL PIPES OR CONDUIT	1	WL 1054, WL 1164	WL 1146	WL 1115
						2	WL 1054, WL 1164	WL 1010, WL 1146	WL 1115
	2	FC 1009, FC 1059	FC 1002	FC 1031		4	WL 1110	WL 1001	
NON-METALLIC PIPE OR CONDUIT	1	FC 2025, FC 2126	FC 2024	FC 2059	NON-METALLIC PIPE OR CONDUIT	1	WL 2078, WL 2075, WL 2128	WL 2088, WL 2002	WL 2133

CONTRACT NO.  
YEAR

FIRESTOPPING  
07840 - 9

MBTA  
Rev 09/07

						2	WL 2078, WL 2075, WL 2128	WL 2088, WL 2002	WL 2133
	2	FC 2025, FC 2126	FC 2024	FC 2059		4	WL 2184, WL 2245	N/A*	
SINGLE OR BUNDLED CABLES	1	FC 3012, FC 3044	FC 3017	FC 3050	SINGLE OR BUNDLED CABLES	1	WL 3065	WL 3032, WL 3030	WL 3153
						2	WL 3065	WL 3032, WL 3030	WL 3153
						4	WL 3139	N/A*	
	2	FC 3012	FC 3017	N/A	CABLE TRAY	1	WL 4011, WL 4019	WL 4004	WL 4032
						2	WL 4011, WL 4019	WL 4004	WL 4032
						4	WL 8014	N/A*	
INSULATED PIPES	1	FC 5004, FC 5036, FC 5037	FC 5014	FC 5025	INSULATED PIPES	1	WL 5029, WL 5096	WL 5040, WL 5001, WL 5032	WL 5062
						2	WL 5029, WL 5096	WL 5040, WL 5001, WL 5032	WL 5062
						2	FC 5004	N/A*	FC 5025
	4	WL 5073							
NON-INSULATED MECHANICAL DUCTWORK WITHOUT	1	FC 7013	FC 7001		NON-INSULATED MECHANICAL DUCTWORK WITHOUT	1	WL 7040, WL 7042	WL 7008	WL 7037

CONTRACT NO.  
YEAR

FIRESTOPPING  
07840 - 10

MBTA  
Rev 09/07

DAMPERS					DAMPERS				
						2	WL 7040, WL 7042	WL 7008, WL 7013, WL 7016	WL 7037
						4			
MIXED PENETRANTS	1	FC 8014, FC 8026	FC 8013	N/A	MIXED PENETRANTS	1	WL 8004, WL 8013	WL 8010	WL 8017
						2	WL 8004, WL 8013	WL 8010, WL 8002	WL 8017
	2	N/A*	N/A*	N/A		4	WL 8014 WL 8014	N/A*	

\* No UL-Classified system is available as of August 2003. Engineer Judgement Drawing Required

**NOTES:**

1. Jobsite conditions of each through-penetration firestop system must meet all details of the UL-Classified System selected.
2. If jobsite conditions do not match any UL-classified systems in the schedules above, contact firestop manufacturer for alternative systems or Engineer Judgement Drawings.
3. Coordinate work with other trades to assure that penetration opening sizes are appropriate for penetrant locations, and vice versa.
4. For 3-hour rated gypsum walls, contact the firestop manufacturer for a UL-classified system or engineer judgement drawing.
5. The Contractor shall verify that the schedule is current at the time of construction, and that each referenced system is suitable for the intended application.

## **PART 4 - MEASUREMENT AND PAYMENT**

### **0.1 MEASUREMENT**

- A.** Firestopping will be measured as per linear foot complete in place, including all preparation, accessories and incidentals.

### **0.2 PAYMENT**

- A.** Payment for firestopping will be made at the Contract unit price for the quantities as specified above.

### **0.3 PAYMENT ITEMS**

ITEM NO.	DESCRIPTION	UNIT
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CONTRACT NO.  
YEAR

FIRESTOPPING  
07840 - 11

MBTA  
Rev 09/07

0720.108 FIRESTOPPING

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**END OF SECTION**

## **NOTES TO THE DESIGNER**

- A.** Any request to modify or waive the specification requirements listed below must be approved in writing by the MBTA's Director of Design:

1. None